NUTRITIONAL STATUS OF 6-59 MONTHS CHILDREN IN RAJBANSHI COMMUNITY, MECHINAGAR MUNICIPALITY, JHAPA

by

Denish Sitoula

Department of Nutrition & Dietetics

Central Campus of Technology

Institute of Science and Technology

Tribhuvan University, Nepal

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Nutritional Status of 6-59 Months Children in Rajbanshi Community, Mechinagar Municipality, Jhapa

A dissertation submitted to the Department of Nutrition & Dietetics, Central Campus of Technology, Tribhuvan University, in partial fulfillment of the requirements for the degree of Bachelor in Nutrition and Dietetics.

by

Denish Sitoula

T.U. Registration No. 5-2-0008-00

Symbol No: 80070

Department of Nutrition & Dietetics

Central Campus of Technology

Institute of Science and Technology

Tribhuvan University

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Tribhuvan University

Institute of Science and Technology

Department of Nutrition & Dietetics

Central Campus of Technology

Dharan

Approval Letter

This *dissertation* entitled ***"Nutritional Status of 6-59 Months Children in Rajbanshi Community, Mechinagar Municipality, Jhapa"*** presented by **Denish Sitoula** has been accepted as the partial fulfillment of the requirements for **Bachelor degree in Nutrition & Dietetics.**

Dissertation committee

1. Chairperson _____

(Mr. Kabindra Bhattarai, *Asst. Prof.*)

2. External Examiner _____

(Mr. Birendra Kumar Yadav, *Asst. Prof*)

3. Supervisor _____

(Mr. Yadav KC, *Asst. Prof*)

4. Internal Examiner _____

(**Mr. Aashik Jha, Teaching *Asst.***.)

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(Denish Sitoula)

Abstract

Nutritional status of children is a proxy indicator for assessing the entire population health status and one of the major predictors of child survival. Despite the various efforts, malnutrition among children is remaining as a major public health problem in Nepal. The objective of the study was to assess nutritional status among 6-59 months children of Rajbanshi community residing in Mechinagar Municipality, Jhapa. Anthropometric measurements were taken to determine the prevalence of malnutrition among children. A structured questionnaire was administered to the mothers for demographic and socio-economic information. As Ms-Excel 2016 was used for database entry; WHO Anthro version 3.2.2 and SPSS version 20 were used to analyze data, and Chi-square test was used to analyze the associated factors of malnutrition.

Prevalence of malnutrition among children was 6.25%, 5% and 5% for stunting, underweight and wasting respectively. In addition to these indicators, 6.25% of children were acutely malnourished as measured by MUAC. There was significant association of stunting with continuing breastfeeding for 2 years ($P \leq 0.05$), while family type ($p=0.023$), continuing breastfed for 2 year ($p=0.002$) and initiation of breastfeeding ($p=0.003$) were significantly associated with underweight. Moreover, immunization during pregnancy and exclusive breast feeding were statistically significant with wasting. From the findings of this study, it is concluded that malnutrition is still an important problem among Rajbanshi community children of age 6-59 months living in Mechinagar Municipality. Therefore, special attention should be given on intervention of malnutrition at this community.

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List of abbreviations

Abbreviations	Full form
BMI	Body Mass Index
BAZ	BMI For Age Z-Score
CDC	Centers for Disease Control
EAR	Estimated Average Requirement
HAZ	Height For Age Z-Score
ICMR	Indian Council of Medical Research
MoHP	Ministry Of Health and Education
MUAC	Mid-Upper Arm Circumference
NDHS	Nepal Demographic Health Survey
PEM	Protein Energy Malnutrition
RDA	Recommended Dietary Allowance
SAM	Severe Acute Malnutrition
UNICEF	The United Nations Children's Fund
WHO	World Health Organization
WAZ	Weight For Age Z-Score

Part I

Introduction

1.1 Background information

Nutritional status is the condition of health of individual as influenced by the utilization of the nutrients. Under nutrition and various forms of nutritional deficiencies are most widely prevalent in rural areas of developing countries. These problems arise from inadequate food intake both in quality and quantity which results due to low family income, low productivity of crops and livestock, low literacy rate, unequal distribution of food, socio culture and environmental sanitation etc. The child development is a dynamic process that utilizes the genetic potential of the baby to achieve full potential within the context of available environment. Throughout the world, there are growing concerns about developmental, behavioral, social and emotional wellbeing of children (Rimal *et al.*, 2014). Health is defined as the state of complete physical mental and social wellbeing and not merely absence of diseases or infirmity (WHO, 1995).

Nepal is least developed nations in South-East Asia Region (SEAR), which was ranked 145 among 188 countries in the Human Development Index (UNDP, 2014). A survey report released by NDHS on 2016 said 36% of children under age 5 are stunted ,10% are wasted ,27% are under weight and 1% are overweight (MOH, 2017). In general, the nutritional status of children in Nepal has improved over the last five years i.e., from 2011 to 2016. The prevalence of stunting and of underweight among the children under age 5 have markedly decreased from 57% to 36%, and from 42% to 27% in last 20 years (1996- 2016). This indicates the stunting in the children declined by 14% between 2001 and 2006, declined by an additional 16% between 2006 to 2011, and dropped by 12% between 2011 and 2016. A similar downwards trends are observed for underweight children (MOH, 2017).

Strategies to improve Infant and Young Child Feeding (IYCF) are the key components of the child survival and development programs of many nations, supported by UNICEF and WHO. The scientific rationale for this decision is clear, with steadily growing evidence of underscoring the essential role of breastfeeding and complementary feeding as major factors in child survival, growth and development. Factors for success, in general, are the large-scale implementation of comprehensive, multi-level programs to protect, promote, and support breastfeeding, with strong Government leadership and broad partnerships. Despite the

achievements, there is still significant room for improvement and acceleration in programming to improve infant and young child nutrition. This includes both increasing and sustaining good breastfeeding practices as well as interventions to improve complementary feeding (Unicef, 2018a)

Mechinagar is a Municipality Jhapa district, Province No. 1, Nepal. It expanded its territory in 2017 A.D. It has approximately area of 192.52 square kilometers. The city lies in the most eastern part of Nepal, which is largest municipality of Jhapa District. The city has Arjun-dhara and Birtamod municipality in the western part, Budhasanti Gaupalika and Illam in the north, Bhadrapur in the south and India in the eastern part. It has a total population of 111797 of which 54,148 are males and 58,849 are females living in 6347 individual houses.

1.2 Statement of the problem

Nutritional status is well characterized by malnutrition. Malnutrition is the pathological condition resulting from relative or absolute deficiency or excess of one or more nutrient, this state being clinically manifested and detected by biochemical, anthropometric and physiological tests (Lodhi, 2010). In developing country like Nepal malnutrition is a major public health problem that creates obstacles in growth and development and children survival. Prevalence of malnutrition is 48.6% among under five children. PEM and micronutrient deficiencies are very common (Borgan.*et al.,* 2010). PEM is a very common problem in children under five years of age in Nepal and is a significant contributor to morbidity and mortality accounting for more than half of all child deaths. In particular, PEM is one of the leading manifestations of malnutrition. Nepal suffers from extensive malnutrition, ranking in the top 10 countries with the highest prevalence of stunting (UNICEF, 2006).

Children under five years of age are very vulnerable to the malnutrition. These children from higher rank family are mostly provided with optimum nutrient and are well breastfed from their parents and they often become overweight. The children from the low-income family are not breastfed properly and complementary foods are also not provided sufficiently so there is high chance of malnutrition. None of the study has been carried in under five children of Rajbanshi community regarding their nutrition status. Thus, the study was designed to assess the prevalence of malnutrition and its associated factors in this marginalized group of eastern belt.

1.3 Objectives

1.3.1 General objectives

To assess the nutritional status of 6-59 months children in Rajbanshi community, Mechinagar municipality, Jhapa

1.3.2 Specific objectives

- To assess the prevalence of malnutrition using anthropometric measurement.
- To carry out household survey to find out the socioeconomic status, condition of health facilities and care and feeding practices of mother and children with the help of questionnaire.
- To identify significant determinants of prevalent malnutrition in Rajbanshi community with the help of obtained information.

1.4 Research Questions

- What is the nutritional status of under-five year children in Rajbanshi community, Mechinagar, Jhapa, Nepal?
- What are the contributing factors associated with nutritional status of under five children of Rajbanshi community?

1.5 Significance of Study

- The study will provide information regarding the nutritional status of children between 6 – 59 months of age to the governmental and non-governmental organization which will be helpful to initiate corrective measures for the problem.
- Encourage Rajbanshi people to improve their children nutritional status by improving feeding pattern and habit of children, pregnant and lactating women.
- Serve as a helpful guide to make proper nutritional program for this community from the facts determined in this work.
- Discover the problems related to nutrition, care practices, economic condition and feeding behaviors of this community.
- Identify marginalized individual or population group who are at high risk of being malnourished and need special care and attention.

1.6 Conceptual Framework

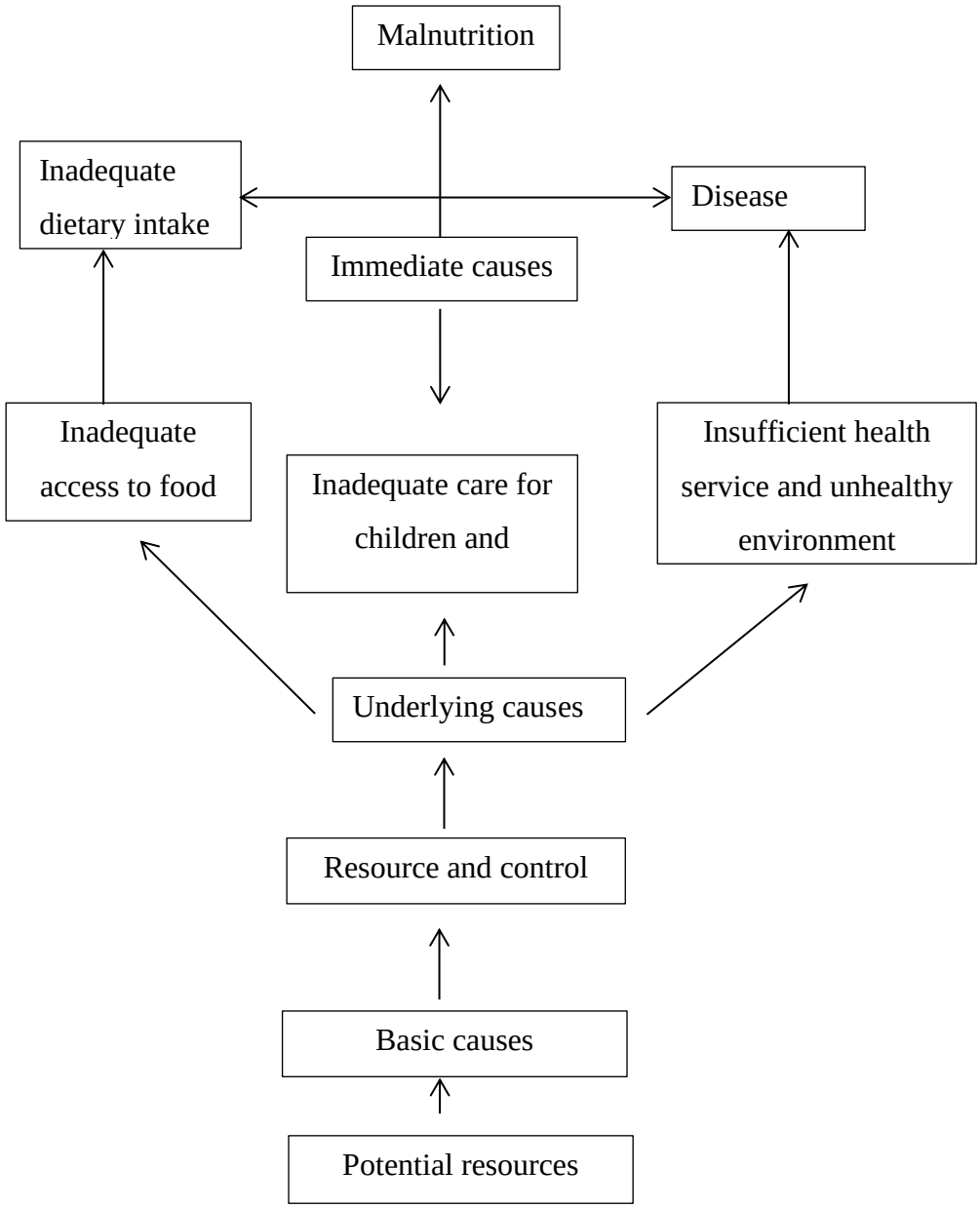

Fig 1.1: UNICEF conceptual framework (UNICEF, 2015)

1.7 Limitation of the study

- Dietary diversity during 24 hours which is the immediate determinant of nutritional status of children was not included in the study
- The study is cross-sectional in design, it neither represents seasonal variation of nutritional outcomes particularly to wasting status nor establishes correct temporal causal relationship of predictors and the outcomes variables.

Part II

Literature review

2.1 Nutritional status

Nutrition is defined as a science concerned with the role of food and nutrients in the maintenance of health. The science of Nutrition has been developed by using the combine knowledge of the physical and biological sciences. Its application involves the social sciences related to man's behavior - Psychology, sociology, anthropology and economics (John *et al.*, 2004).

Nutrition is the science of foods, the nutrients, and other substances therein, their actions, interaction and balance in relationship to health and disease; the processes by which the organism ingests, digests, absorbs, transports and utilizes nutrients and disposes the end products. In addition, nutrition is concerned with social, economic, cultural and implications of foods and eating (B. Srilakshmi, 2016).

Recent report on the nutrition situation in the world shows that the burden of malnutrition is unacceptably high and affects every country in the world. Children under five years of age face multiple burdens: 150.8 million are stunted, 50.5 million are wasted and 38.3 million are overweight. Meanwhile 20 million babies are born of low birth weight each year (Initiatives, 2018). Nepal is facing the vicious cycle of PEM i.e. poverty, population explosion, and environmental degradation. However various types of governmental and nongovernmental health programs have been launched from time to time but they are still need improvement (Chaudhary, 2017).

2.2 Factors Affecting Nutritional Status

The factor affecting nutritional status are; mother's food security, types of food given to the young children, feeding frequency, poverty, illiteracy, ignorance to the child for care and feeding, status of woman and child nutrition and last but not the least who feed the child and how the child eats (UNICEF, 1996).

The factors affecting nutritional status are mother's food security, breast feeding practices, types of food given to young children, feeding frequency, status of women and child nutrition and last but not the least who feeds the child and how the child eats (NMICS, 2010). There are many other factors that influence the nutritional status some of which are food availability

and its distribution system, consumption of food, income source and purchasing power, family size, illiteracy, sociocultural and religious belief, birth order, family occupation, environmental sanitation and health facility. The major causes of nutritional deficiency in developing country like Nepal is poverty, lack of food security and nutrition education (Devkota *et al.*, 2015). Some of them are explained below:

1. Inadequate dietary intake: This can mean both macro nutrients (fat, protein, carbohydrate) and micro nutrients (vitamins and minerals). Though insufficient macro nutrient intake has serious implications for health and well-being, micro nutrients also play large role in immune function (Bhatta *et al.*, 1998).
2. Cooking practices: Draining away the rice water at the end of cooking, prolonged boiling in open pans, peeling of vegetable all influences the nutritive value widely from region to region and influence the nutritive value food (Amruth, 2012).
3. Impact on immune function: Insufficient macro nutrient intake can result in growth stunting (in children) as well as weight loss. Micro nutrients such as vitamin A, zinc and a large number of others are essential to a number of immune responses, and deficiency can lead to suppressed immunity, which in term increases risk of acquiring infection. In addition, in adequate dietary intake can also weaken immune response through changes in mucus membranes of the body (Bhatta *et al.*, 1998).
4. Infection: Once immune function is lowered, it may lead to infectious disease. Malnutrition not only affects the occurrences of infectious diseases, it can also increase the severity of illness, and the length of time they are experienced (Bhatta *et al.*, 1998).
5. Poverty: At a micro-level, child malnutrition is related to poverty, but at the macro-community level poverty does not appear to be strongly related to child malnutrition in many cases. Other actors are equally important. One of these is related to the intra-household use of resources such as the time management and knowledge of the main caregiver, who is usually the mother (Bocabo and Eusebio, 1988).
6. Religion: Religion has powerful influences on the food habit of the people. Hindus do not eat beef and Muslim pork. Orthodox Hindu does not eat meat, fish, egg and certain vegetable like onion. These are known as food taboos which prevent people from consuming nutritious food even these are easily available (Amruth, 2012).
7. Child rearing practices: These vary widely from region to region and influence the nutritional status of infants and children. Examples of these situation are premature curtailment of breast feeding, the adoption of bottle feeding and adoption of

commercially produced refined food, during eating time roaming around, inactive eating and watching television also effect the nutrition status of child (Amruth, 2012).

8. Health & Nutrition education: It is opined that by appropriate educational action, 50% of nutrition problem can be solved. Health education and nutrition education program is often a weak component. Its reinforcement is a key element in all health service development (Amruth, 2012).

2.3 Malnutrition

Malnutrition is a disease condition resulting from a relative or absolute deficiencies or excess of one or more nutrient. It may or may not manifest clinically. In the case of latter, the disease may be detected only from biochemical indices of nutritional status. Malnutrition has been defined in different ways. Some believe that it is the result of an imbalance in the intake of nutrient; whereas other says that it is the result of nutrients interaction with body. There are still others who say it is depending on the type of nutrients responsible for the diseases. Nevertheless, both over-nutrition and under-nutrition are considered malnutrition (Jelliffe, 1996). Malnutrition is a pathological condition of varying degree of security and disease clinical manifestation, resulting from the deficient assimilation of component of nutrient complex. The diseases affect the physiological patterns of tissue, reduce the defensive capabilities to withstand different environmental condition and lower both the efficiency and ability in work shortens life. On the other hand, Gopalan and his co-workers produced evidence that there is no difference in the diet of children as the clinical picture reflects not a difference in diet but difference in the capacity of the child to adopt (Gopalan, 2000).

Malnutrition has been defined as a pathological state resulting from a relative or absolute deficiencies or excess of one or more essentials nutrients, it comprises four forms of under nutrition, imbalance and the specific deficiency (Gebre *et al.*, 2019).

1. Under-nutrition: This is the condition which results when insufficient food is eaten over an extended period of time. In extreme cases, it is called starvation (Gebre *et al.*, 2019).

2. Over nutrition: This is the pathological state resulting from the consumption of excessive quantity of food over an extended period of time. The high incidence of obesity, atheroma and diabetes in western societies is attributed to over nutrition (Gebre *et al.*, 2019).

3. Imbalance: It is the pathological state resulting from a disproportion among essential nutrient with or without the absolute deficiency of any nutrient (Gebre *et al.*, 2019).

4. Specific deficiency: It is the pathological state resulting from a relative or absolute lack of an individual nutrient (Gebre *et al.*, 2019).

The effect of malnutrition on the community is both direct and indirect. Direct effects are the occurrence of frank and subclinical nutrition deficiency diseases such as kwashiorkor, marasmus and vitamins & minerals deficiency disease. Indirect are, high morbidity and mortality among young children (nearly 50% of total death in the developing countries occur among children five years of age as compare to less than 5 percent in developed countries), retarded physical and mental growth and development (which may be permanent), lowered vitality of the people leading to lowered productivity and reduced life expectancy (Amruth, 2012).

Malnutrition and infection are inter-related. Malnutrition encourages infection and infected children had poor nutritional intake as well as absorption ultimately lead towards Malnutrition. The morbidity arising was from as a result of complication from such infectious diseases such as tuberculosis and gastroenteritis are not considerable. The high rate of maternal mortality, stillbirth and low birth–weight are all associated with malnutrition (Park, 2011).

2.4 Nutrition deficiency disorders

2.4.1 Protein energy malnutrition

The World Health Organization defined PEM as a range of pathological conditions arising from coincidental lack, in varying proportions, of infants and young children and commonly associated with infections. PEM in early childhood is the predisposing factor that leads too much of the mortality and morbidity in children under five (MOHP, 2006).

- **Marasmus**

It usually occurs in children under 1 year of age when the quantity of mother's breast milk is insufficient to provide adequate amount of protein and calories for a growing child and when the supplementary feeding is inadequate. Nutritional marasmus is principally due to the consumption of diet markedly deficit in both protein and calories and is usually participated by diarrheal disease (Swaminathan, 2008).

- **Kwashiorkor**

Kwashiorkor is a Ghanian word meaning "the sickness affecting children deprived of mother's breast". Kwashiorkor is far more common among poor communities and the depressed social classes than among privileged people. It occurs at the time when the calories are adequate but the protein is inadequate. Growth is retarded and although the muscles are wasted and flabby, there is usually more subcutaneous fat than marasmic children. There is also edema; the child appeared 'moon faced' and the hair often turns red brown or gray (Swaminathan, 2008).

- **Marasmic Kwashiorkor**

When the incidence of PEM is high, a large number of cases show some of the feature of both marasmus and kwashiorkor (Swaminathan, 2008).

2.4.2 Vitamin A Deficiency Disorder

Vitamin A deficiency (VAD) is a nutritional deficiency of high magnitude that can be caused by insufficient intake of vitamin A food sources or by vitamin absorption, transport or metabolism process. The importance of adequate vitamin A is indisputable, as it has very diverse physiological roles in the visual process, in the integrity of epithelial tissue and immune system, as well as in other metabolic function. Anemia can result from VAD in children and women, likely due to multiple apparent roles of vitamin A in supporting iron mobilization and transport, and hematopoiesis (Adhikari, 2013). Three trials from southern Asia have reported that neonatal vitamin A supplementation reduced mortality by 21% in the first six months of life (Bhutta, 2008) while two other studies conducted in Africa showed no impact of this intervention (Benn, 2008). One study has reported an approximate 40% reduction in maternal mortality following routine dietary supplementation with vitamin A during pregnancy (West *et al.*, 2007).

2.4.3 Iron Deficiency Anemia

Iron deficiency anemia is a global health problem and medical condition seen in everyday clinical practice. Iron deficiency has a substantial effect on the lives of young children and premenopausal women in both low-income and developed countries. Iron deficiency affects more than 2 billion people worldwide (McLean *et al.*, 2009), and iron deficiency anemia remains the top cause of anemia, as confirmed by the analysis of a large number of reports on the burden of disease in 187 counties between 1990 and 2010 (Kassebaum *et al*., 2014) and by a survey on the burden of anemia in person at risk, such as preschool children and young

women (Stevens *et al.,* 2013). Preventions programs have decreased the rate of iron deficiency anemia globally; the prevalence is highest in Central and West Africa and South Asia (Kassebaum *et al.,* 2014).

In developing countries, iron deficiency anemia typically result from insufficient dietary intake, loss of blood due to intestinal worm colonization, or both. In high income countries, certain eating habits (e.g., a vegetarian diet or no intake of red meat) and pathological conditions (e.g., chronic blood loss or mal absorption) are the most common causes. Paradoxically, it appears to be more difficult to reduce the prevalence of iron deficiency anemia in high income countries than in low-income countries. One reason for this seeming paradox is the high rate of iron deficiency in ageing populations (Longo and Camaschella, 2015).

2.4.4 Iodine deficiency disorder

Iodine deficiency disorders (IDD) refers to all the adverse effects and consequences of iodine deficiency in a population that can be prevented by ensuring an adequate intake of iodine (United Nations Children's Fund). Iodine deficiency disorder (IDD) is a public health problem in Nepal and government programs have been geared towards promoting universal salt iodization (USI) since 1998, under each five-year Plan of action for Control of IDD, in collaboration with UNICEF and JICA (MoHP, 2018). The fortification of salt with iodine is the most common method of preventing IDD. Fortified salt that contains 15 parts per million (ppm) or more iodine at the consumption level is considered s adequately iodized to prevent IDD (WHO, 2021).

2.5 Nutritional status of children

Nutritional status is the condition of health of the individual as influenced by the utilization of the nutrients. It can be determined only by the correlation of information obtained through a careful medical and dietary history, through physical examination and appropriate laboratory investigation (B Srilakshmi, 2019).

Under nutrition places children at an increased risk of morbidity and mortality and is also associated with impaired mental development. Anthropometry provides one of the most important indicators of children's nutritional status. The height and weight data are used to compute three summary indices of nutritional status: height-for-age; weight-for-height; and weight-for-age. These three indices are expressed as standard deviation units from the median for the international reference population recommended by the World Health Organization. Children who fall more than two standard deviations (-2 SD) below the reference median are regarded as undernourished, while those who fall more than three standard deviations (-3 SD) below the reference median are considered severely undernourished (Srilakshimi, 2002).

Assessment of nutritional status of community is one of the first steps in the formulation of any public health strategy to combat malnutrition. The principle aim of such an assessment is to determine the type, magnitude and distribution if malnutrition in different geographic areas to identify at risk groups and to determine the contributory factors (Srilakshimi, 2002). A survey report released by NDHS on 2016 said 36% of children under age 5 are stunted ,10% are wasted ,27% are under weight and 1% are overweight (MOH, 2017).

In general, the nutritional status of children in Nepal has improved over the last five years i.e, from 2011 to 2016. The prevalence of stunting and of underweight among the children under age 5 have markedly decreased from 57% to 36%, and from 42% to 27% in last 20 years (1996- 2016). This indicates the stunting in the children declined by 14% between 2001 and 2006, declined by an additional 16% between 2006 to 2011, and dropped by 12% between 2011 and 2016. A similar downwards trends are observed for underweight children (MOH, 2017).

2.6 Assessment of nutritional status

Assessment of nutritional status of community is one of the first steps in the formulation of any public health strategy to combat malnutrition. The principle aim of such an assessment is to determine the type, magnitude and distribution of malnutrition in different geographic areas to identify population at risk groups and to determine the contributory factors In addition, fractural evidence of the exact magnitude of malnutrition is essential to sensitize administrators and politicians to obtain allocation of materials and human resources and to plan appropriately (Srilakshimi, 2002).

The nutritional assessment may require encompassing nations, communities, and vulnerable segments of communities or individuals. It may be done as a part of an exercise to document current status as compared with post status or as specific attempt to evaluate the, impact of an intervention program (Ramchandran. *et al.*, 1987).The assessment of nutritional status can be done using the following information:

a). Direct method: Deals with the individual and measure objective criteria. eg. Anthropometry, Clinical examination, Biochemical and Dietary method (Shrivastava *et al.*, 2014).

b). Indirect method: Use community indices that reflect the community nutritional status or need. eg. Vital statistics: Morbidity, mortality rates, as specific mortality or Ecological factors: Socio-economic status, housing, environmental hygiene, education services and conditioning infection (Shrivastava *et al.*, 2014).

2.7 Anthropometric assessment

It is the physical measurement of the human body and is commonly used to estimate the nutritional status of children. Anthropometry measures have been extensively used for identification and classification of children suffering from protein-energy malnutrition (PEM). Different anthropometric measurements are combined as ratios or indices such as weight-for-age, weight for height and height for age (Pietsch, 2000).

2.7.1 Height-for-age (H/A)

H/A is an indicator of past or chronic malnutrition. H/A cannot be used to measure short term changes in malnutrition. Stunting refers to a child who is too short for his or her age. These children can suffer severe irreversible physical and cognitive damage that accompanies stunted growth. The devastating effects of stunting can last a lifetime and even affect the next generation (Unicef, 2018b).

The height for age index provides an indicator of linear growth retardation and cumulative growth deficits in children. Children whose height for age z-score is below minus two standard deviation (-2 SD) from the median of WHO reference population are considered short for age (stunted) or chronically malnourished. Children below minus three standard (-3 SD) deviation are considered severely stunted (WHO, 1996).

Stunted growth is a reduced growth rate in human development. It is a primary manifestation of malnutrition in early childhood, including malnutrition during fetal development brought on by the malnourished mother. In developing countries, stunted growth is a common problem affecting a large percentage of children. Once established, stunting and its effects typically become permanent. Stunted children may never regain the height lost as a result of stunting, and most children will never gain the corresponding body weight. It also leads to premature death later in life because vital organs never fully developed during childhood (Andrew and Jean, 2014)

2.7.2 Weight-for-height (W/H)

Weight-for-Height (W/H) helps to identify children suffering from current or acute malnutrition. It is used to examine short term effects, i.e. recent rapid weight loss associated with a period of starvation and/or severe disease (Gomez *et al.*, 1995).

The weight for height index measures body mass in relation to body height or length and describes current nutritional status. Children with z-score below minus two standard deviation (-2SD) are considered thin (wasted) or acutely malnourished. Wasting represents the failure to receive adequate nutrition in the period immediately preceding the survey and may be the result of inadequate food intake or recent episode of illness causing loss of weight and the onset of malnutrition. Children with a weight for height index below minus three standard deviation (-3 SD) are considered severely wasted. The weight for height index also provides

data on overweight and obesity. Children more than two standard deviations (+2 SD) above the median weight for height are considered overweight or obese (Unicef, 2018b).

Wasting results from weight falling significantly below the expected weight of a child of the same length or height. Wasting indicates current/acute malnutrition resulting from feeding practices, diseases and infection, or, more frequently, a combination of these factors. Wasting in individual children and population groups can change rapidly and shows marked seasonal patterns associated with change in food availability or disease prevalence (Smith and Haddad, 2000).

2.7.3 Weight-for-age (W/A)

Low weight-for-age identifies the condition of being underweight at a specific age. W/A may reflect both past (chronic) and present (acute) under nutrition; however, it is unable to distinguish between the two (Smith and Haddad, 2000).

Children whose weight for age Z -score is below minus two standard deviations (-2SD) are classified as underweight while children whose weight for age Z – score is below minus three standard deviation (-3SD) are considered severely underweight (WHO, 1996).

2.7.4 BMI for Age

BMI is used differently for children. It is calculated in the same way as for adults, but then compared to typical values for other children of the same age. Instead of comparison against fixed thresholds for underweight and overweight, the BMI is compared against the percentile for children of the same sex and age (Cashin and Oot, 2018).

A BMI that is less than the 5th percentile is considered underweight and above the 95th percentile is considered obese. Children with a BMI between the 85th and 95th percentile is considered to be overweight (CDC, 2007).

2.8 Nutritional requirement

Nutritional requirement can be defined as the minimum amount of the absorbed nutrient that is necessary for maintaining the normal physiological function of the body (B Srilakshmi, 2019). This nutrient reference provides four sources of information:

1. Recommended Dietary Allowance (RDA): The average intake of a nutrient thought to meet the nutrient requirements of nearly all (97%) healthy people in a specific life stage and sex (B Srilakshmi, 2019).
2. Adequate Intake: A recommended average daily level based on observed determined approximations or estimates of nutrient intake by a group of apparently healthy people, which are assumed to be adequate-used when an RDA cannot be determined (B Srilakshmi, 2019).
3. Tolerable Upper Intake Level (UL): the highest average daily nutrient intake level that is likely to pose no risk of adverse health effect for almost all individual in the general population (B Srilakshmi, 2019).
4. Estimated Average Requirement (EAR): The average daily nutrient intake level estimated to meet the requirement of half of the healthy individuals in a particular life stage and gender group (B Srilakshmi, 2019).

Table 2.1: The recommended daily allowance (RDA) of nutrients for 6-59months children

Nutrients	**Children RDA**		
	6-12 months	**1-3yr**	**4-6yr**
Body weight(kg)	8.4	12.9	18
Calories (kcal)	80 kcal/kg/d	1060	1350
Protein (g)	1.69/kg/d	16-7	20.1
Visible fat (g)	19	27	25
Calcium (mg)	500	600	600
Iron (mg)	05	9	13
Vitamin A(μg)	350	400	400
Thiamine (mg)	0.3	0.5	0.7
Riboflavin (mg)	0.4	0.6	0.8
Niacin equivalent (mg)	6.5	8	11
Pyridoxine (mg)	0.4	0.9	0.9

Source:(ICMR, 2010)

PART III

Materials and Methods

3.1 Materials

Instruments and equipment necessary for the conduction of the survey are:

a) **Weighing Machine:** 1 Piece

For measuring the weight of the children digital weighing machine with the capacity of 100 kg and having the least count of 0.1 kg, manufactured by Micro-life Pvt. Ltd was used.

b) **Height measuring scale** (stadiometer): 1 Piece

For measuring the height of children, height-measuring stadiometer was taken. It was prepared under the supervision of Central Campus of Technology, Department of Nutrition and Dietetics.

c) Questionnaire: A well designed and pretested set of questionnaires was prepared to collect household information.

3.2 Research design

A cross-sectional study of 6-59 months children in Rajbanshi community, Mechinagar municipality was carried to study nutritional status and its associated factors. The nutrition survey of children consists 2 parts:

1. Socio-demographic survey with the help of questionnaire
2. Anthropometric measurements: Height, Weight and MUAC.

3.3 Research area

Study was carried at the different wards of Mechinagar municipality. The blue mark on the map gives the location of Community residing in Mechinagar, municipality. The Mechinagar lies in eastern terai of Nepal bordering with Birtamode municipality in west, Illam in north, Bhadrapur municipality in south, and West Bengal state of India in east.

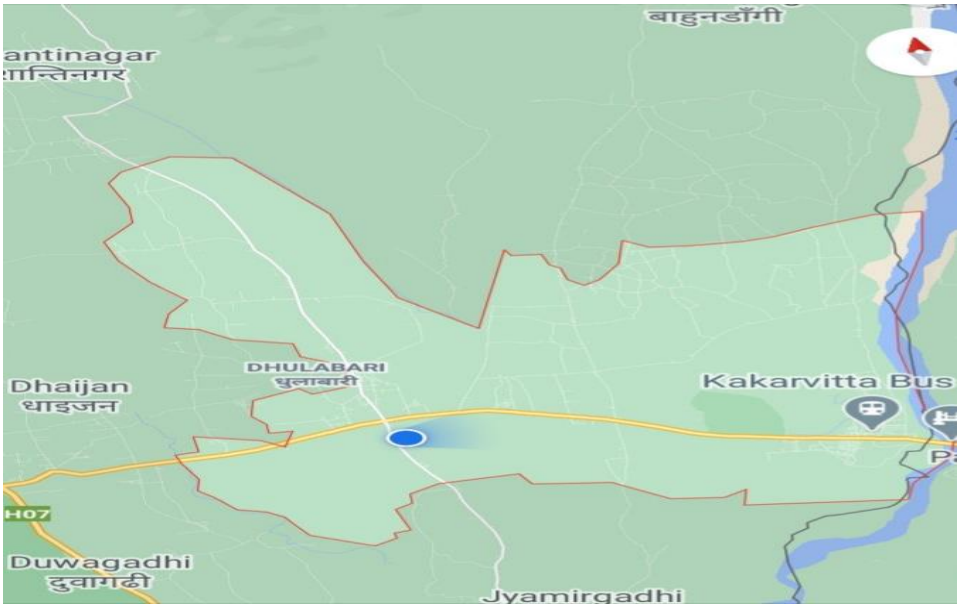

Fig 3.1: Map of study area

3.4 Study variables

Study variables were categorized into two groups: dependent variable and independent variable. Dependent variable of the study was nutritional status of 6-59 months children as indicated by stunting, wasting and underweight. Whereas, independent variables of the study were:

1. Socio-economic and demographic variables: Ethnicity, family size, income, occupation, education
2. Child characteristics: Age, sex, birth order, breastfeeding status and morbidity status.
3. Child care practices: Feeding, hygiene
4. Maternal characteristics: Age, iron and folate intake, number of children born.
5. Environmental condition: Water supply, sanitation and housing condition.

3.5 Target population

Children under five years of age were included as target population while their parents or caretakers were assumed as respondents (parents) to answer the questionnaire.

Inclusion criteria

Children aged 6-59 months of Rajbanshi community and their caretakers who live in Mechinagar municipality was included in study.

Exclusion criteria

The study participants who were seriously ill or who were not available at household during the time of survey was not selected in the study.

3.6 Sampling technique

Cross–sectional descriptive study was conducted among Rajbanshi community residing in Mechinagar municipality. Stratified simple random sampling method was used to select children from households. It was found only in nine wards Rajbanshi peoples were residing and 3 wards were selected by lottery method. From each ward 27 household were chosen randomly. The basic criterion for the selection of household sample was that the household with at least one child of 6-59 months of age was included in the sample. In case of missing child in the sampled household, the next house nearest to it with a child below five year was taken to obtain the required sample size.

3.7 Sample Size

The sample size was determined by using a single proportional formula assuming the prevalence rate of malnutrition to be 50%, 95% confidence interval (CI), 10% margin of error (d) and 10% non-response rate was added to the total calculated sample size. Sample size was calculated using the given statistical formula.

$n=z^2. PQ/d^2$where, n = required sample size

z = z value at confidence interval of 95% (standard value of 1.96)
P = estimated prevalence of malnutrition in project area Q = 1-P
d = precision level, we have, z = 1.96
P=0.5, Q=0.5
d=0.1
Now, the sample size will be obtained as-:
$n=1.96^2*0.5*0.5/0.1^2 =96$

From the pilot survey and personal communication of this Committee has total no. of under five children are 300 out of 408 households, whose total population in Mechinagar is 1639. Now, we apply finite population sample formula to obtain new sample size to conduct survey in this particular area. Therefore,

New SS = SS / [1+ (SS-1) / POP]

where,

New SS = New sample size for finite population
SS = Sample size in infinite population
POP = Total number of population (in this case total number of under five children in the VDC)
Now, new sample size is further calculated below-:
=SS / [1+ (SS-1) / POP]
=96/ [1+ (96-1)/300]
=72.9 = 73
Non response rate as 10%
Now required sample size = 73+ 10%*73= 80
Hence desired sample size for the conduction of this survey was 80.

3.8 Pre-testing

Pre- testing of the developed interview schedule was done to establish accuracy of questions and clarity and to check for consistency in the interpretation of questions and to identify ambiguous items. Pre-testing was performed in few individuals from the study site. After review of instruments, all suggested revisions were made before being administered in the actual study. The equipment was tested before the actual survey by measuring some children. Since no fault was found in the equipment, they were confirmed for the actual survey.

3.9 Validity and reliability

Validity refers to the degree to which the data collection instruments will measure what they purposed to measure. Validity of weighing balance was ascertained by comparing the data provided by the weighing balance with standard weights. Likewise, validity of stadiometer was ascertained by comparing the measurement from the stadiometer and UNICEF stadiometer. The aspects tested in the questionnaire were also drawn from the available literature in nutrition about children. The questionnaire was also pre-tested prior to data collection to ascertain content and face validity. Reliability refers to quality control measure of data collected. Before data collection, detailed study was based on the objectives of the study on data collection techniques. Questionnaire was checked daily for completeness, consistency and clarity as mentioned earlier.

3.10 Data collection techniques

Data collection was spread over two phases, namely, initial contact with the parents for completing the semi structured questionnaire followed by anthropometric measurements of children. Data obtained from the respondents was collected with the help of structured questionnaire form in which answers of every question was coded with unique identity for each child.

i) Socio-demographic information: The socio-demographic and economic variables involved asking the children parents about their marital status, income, education and occupation.

ii) Anthropometric assessment: Information from anthropometric measurements were obtained by following methods:

   a) Age: Age was recorded based on documentary evidence (birth certificate).
   b) Weight: Weight was measured by electronic digital weight scale and read to the nearest 0.1k.g with minimum/light clothing and no shoes. Calibration was done before and after weighing every child by setting it to zero (Zeman and Ney, 1988). In case of child unable to stand in scale, both mother and child were weighed simultaneously. Once, the reading was recorded to nearest one decimal point; second measurement was taken with just the mother and the difference of weight was the child's weight (Cogil, 2003).
   c) Length (0-23 months): The recumbent length was taken for children below 2 years. Child was laid flat on board with his/her head against the base of the board and heels against the foot-piece with either shins or knees been pressed. The child's line of sight

was made perpendicular to the ground. The reading was taken to the nearest 0.1 cm (Cogil, 2003)

d) Height (2-5 years): The height of children was measured standing straight on measuring board placed on hard flat surface with line of sight perpendicular to the horizontal surface. Children were made to stand bare foot on height board and with feet parallel and joined together and with heels and buttock touching the wall. It was made sure that that head was held erect, legs straight, heels or claves against the board and hands were hung closely at the sides. The child's height was measured to the nearest 0.1 cm (Zeman and Ney, 1988).

e) Mid-Upper arm Circumference (MUAC): The mid-point of the child's left upper arm was first calculated by locating the tip of the child's shoulder with enumerator finger-tip. The child's elbow was bent to make a right angle. Once the midpoint was located, the child's arm was straightened, measuring tape was wrapped in correct position with proper tension and was not too tight or too loose. The measurement was recorded to the nearest 0.1 cm (Cogil, 2003).

3.11 Data analysis

First the data was checked for completeness and consistency. Then it was coded and entered in the computer using statistical software. Likewise, qualitative data was transcribed and coded by assigning labels to various categories. Verified test parameters were used to establish the relationships between the variables and nutritional status of students.

Data was entered and z-score generated with statistical software. Microsoft Excel 2016, WHO Anthro plus version 3.2.2 and SPSS version 20 were used to analyze data. Descriptive analysis was used to describe the percentage and distribution of respondents by socio-demographic variables, childcare practices and dietary pattern through food frequency of respondents.

3.12 Ethical Consideration

The objectives of the study were communicated to the children and parents were completely voluntary. Study participants were provided with written consent prior to participation. The information obtained from the participants was not be divulged and was held in confidence. Privacy and confidentiality of collected information was ensured at all level. Permission was sought from the relevant authorities: Central Campus of Technology.

Part IV

Results and discussion

The cross- sectional descriptive study with 80 sample size was conducted among Rajbanshi community residing in Mechinagar municipality, Jhapa to find the prevalence and the factors associated with Nutritional status of 6-59 months children. The results and findings of the study are presented in following headings:

4.1 Socio-economic characteristics

The study shows that the major occupation of fathers was engaged in labor with the highest percentage of 33.8%, the second main occupation of fathers was found to be agriculture with 30% and the fathers engaged in foreign employment and business were 20% and 11.2% respectively.

Table 4.1 Economic characteristics of study population (n= 80)

Variables	Frequency	Percent
Father's occupation		
Agriculture	24	30
Labor	27	33.8
Business	9	11.2
Foreign employment	20	25
Mother's occupation		
Housewife	51	63.8
Labor	8	10
Agriculture	21	26.2
Annual Income		
< 1 lakh	24	30
1-3 lakhs	42	52.5
> 3 lakhs	14	17.5

Most of the mothers worked as housewife with highest percentage of 63.8%, 10% of mother's occupation was labor and 26.2% of mothers were involved in agriculture. The study

shows that 30% of the household had annual income less than 1 lakhs, 52.5% of the household had annual income in range between 1 to 3 lakhs whereas 17.5% of the household earned more than 3 lakhs annually.

There were 55% (44) nuclear families and 45% (36) joint families. All the study households were permanent residents. The educational status of fathers of surveyed children was depicted as 62.5% has studied above SLC, while 37.5% hasn't studied above SLC. Similarly, mother who had studied higher secondary level and more were 35%, whereas others haven't completed SLC.

Table 4.2 Socio-demographic characteristics of study population (n=80)

Variables	**Frequency**	**Percent**
Type of Family		
Nuclear	44	55
Joint	36	45
No. of under 5 years child		
Only one	35	43.75
More than one	45	56.25
Father's Education Level		
Below SLC	30	37.5
Above SLC	50	62.5
Mother's Education Level		
Below SLC	52	65
Above SLC	28	35

4.2 Child characteristics

Table 4.3 Child characteristics of study population (n = 80)

Variables	Frequency	Percent
Age		
6-11 months	18	22.5
12-23 months	21	26.25
24-35 months	24	30
36-59 months	17	21.25
Gender		
Female	46	57.5
Male	34	42.5
Birth order		
First	45	56.2
Second	29	36.2
Third	6	7.5
Child birth weight		
< 2.5 Kg	18	22.5
≥ 2.5Kg	62	77.5
Type of Birth		
Natural	68	85
Caesarean section	12	15
Age gap with elder children (n=35)		
Less than 3 years	26	74.3
3-5 years	9	25.7

Out of 80 children of age group 6 – 59 months taken in study, 46(57.5%) were females and 34 (42.5%) were males. Among 80 selected children, 56.2% (45) were first child, 36.2% (29) second child, 7.5% (29) third child of their parents. With regards to birth weight, 22.5% of children had low birth weight (less than 2.5 kg) and 77.5% of children had normal birth weight (2.5 kg and above). Children whose birth weight is less than average are considered to have a higher risk of early childhood death. NDHS 2016 shows 16.4% of children in Eastern Terai were born less than 2.5 kg. Birth weight less than 2.5 Kg is considered as low birth weight (MoPH, 2016). It might be due to under nutrition in women before and during pregnancy (B.

Srilakshmi, 2014). 85% of children were born by natural birth whereas 15% babies were delivered by caesarean birth. More than half (56.2%) of children under study were eldest child of the household. Excluding those families having only one child, 74.3% of children had age gap of less than 3 years with their elder sibling and 25.8% of children had age gap between 3-5 years with their elder sibling.

4.3 Child caring practices

All children under the study were breastfed. NDHS 2016 had also concluded that breast feeding is almost universal in Nepal (MoPH, 2016). This survey shows that 63.8 % of mother breastfed their child within 1 hour of the delivery, 28.8% of them breastfed their child within 8 hours whereas 7.5% of mother breastfed their child after 24 hours of delivery. 85% of the mothers in survey fed colostrum to their children while 15% of mothers didn't feed colostrum milk to their children. Among the study sample, 81.2% were exclusively breastfed for first six months while 18.8% were not exclusively breastfed for six months which is more than the national data 70% of children less than six months of age (MoPH, 2016). However, not following exclusive breastfeeding was still prevalence in the study area. 82.5% of children under survey were breast fed until their second birthday while 17.5% were not fed for 2 years.

Table 4.4 Distribution of different Child caring practices (n=80)

Variables	Frequency	Percent
Time of initiation of breastfeeding		
Within 1 hour of birth	51	63.8
Within 8 hours of birth	23	28.8
After 24 hours of birth	6	7.5
Colostrum feeding		
Yes	68	85
No	12	15
Exclusive Breastfeeding		
Yes	65	81.2
No	15	18.8
Breast feeding for 2 years		
Yes	66	82.5
No	14	17.5

Time of initiation Complementary food		
4 months	8	10
5 months	15	18.8
6 months	57	71.2
Type of Complementary food		
Lito	23	28.8
Jaulo	32	40
Same as other family members	25	31.2
Frequency of Complementary feeding		
One time in a day	4	5
Two times in a day	23	28.8
Three times in a day	43	53.8
Four times in a day	10	12.4
First place of treatment		
Nearby Health post or Hospital	27	33.8
Traditional healer	2	2.5
Both	51	63.8

Majority of child initiated complementary feeding at the age of 6 months with 71.2%, following at the age of 5 months with 18.8%, 4 months with 10% respectively. The type of complementary food given to children was *jaulo* 40% (32), followed by same as other family members in 31.2% (25) and *lito* 28.8% (23). The frequency of complementary feeding is three times a day in 53.8% children, followed by two times a day in 28.8%, four times in 12.4% and one time a day in 5% children.

All the survey households use packaged iodized salt. This finding is similar to that of National Demographic and Health Survey 2016 which revealed that more than 95% of households were using iodized salt (MoPH, 2016). Regarding Vitamin A supplementation, all children were given Vitamin A capsule and deworming tablet during the last Vitamin A campaign. Similarly, the effectiveness of National Vitamin A supplementation program was similar to that of the country as the national data on Vitamin A supplementation showed nine in ten children aged 6-59 months received vitamin A supplement (MoPH, 2016).

As shown in the Table 4.4, the preference of health services for the treatment of children during illness was highest 63.8% (52) to both nearby health post and traditional healer followed by 33.8% (27) to nearby health post or hospital, and 2.5% (2) to traditional healer. This may be due to increase in the knowledge of the people and many treatments which were free of cost in health center provided by the government and also having traditional believe regarding *Dhami and Jhakri.*

4.4 Maternal characteristics

The mean age of mothers under the survey was found to be 21.5±5.5 with the mother of minimum age of 16 years to maximum age of 27 years. The legal age of marriage in Nepal for both gender should be more than twenty years (NLC, 1971). But in study area still 51.2% of mothers were found to be married before the age of less than or equal to 20 years and only 48.8% of mothers got married after the age of 20 years. 28.8% of mother had their first pregnancy at age of less than or equal to 20 years while 71.2% of mother were above 20 years during their first pregnancy.

Majority of mothers 92.5% were supplemented with iron and folate tablets during their pregnancy while 7.5% of mothers weren't supplemented. Regarding health issues during pregnancy, 21.2% of respondent had health issues during pregnancy while 78.8% replied that they had no such complication in the time of pregnancy. On further studying the consumption of alcohol and smoke intake, it showed only 2.5% drinks alcohol while others don't and none of the respondents were habitual on smoking.

Table 4.5 Distribution of maternal characteristics in study population (n=80)

Variables	Frequency	Percent
Marriage age		
≤ 20 years	41	51.2
> 20 years	39	48.8
Age at first pregnancy		
≤ 20 years	23	28.8
> 20 years	57	71.2
Iron and Folate supplementation		
Yes	74	92.5
No	6	7.5
Health issues during pregnancy		
Yes	17	21.2
No	63	78.8
Alcoholism		
Yes	2	2.5
No	78	97.5

4.5 Environmental and sanitation characteristics

Safe drinking water and proper sanitation and hygienic practices are basic necessities for good health. Table 4.6 shows that the main source of drinking water used by the household was drinking water tap 78 (97.5%) while 2 (2.5%) of household drink water from tube-well. According to the national population and housing census 2016, in Jhapa district eighty seven percent of the household used drinking water through tap (Budhathoki, 2019). Half of household purify water before drinking while rest household drinks water without purifying. 2 (2.5%) households under the survey did not have toilet facility and 78(97.5%) households had toilet facility. The mothers who washed their hands after going toilet was 97.5% (78) and 2.5% (2) did not wash their hands after going toilet. More than half i.e. 53.8% (43) households managed their waste product by throwing; whereas 46.2% (37) households managed waste either by incineration or burial method. Major sources of cooking fuel as shown in Table 4.6, indicated that larger percentage of Rajbanshi peoples used firewood (73.8%) as cooking fuel, followed by LPG (26.2%) respectively.

Table 4.6 Environmental and Sanitation characteristics of study population (n=80)

Variables	Frequency	Percent
Source of drinking water		
Tube well	2	2.5
Drinking water tap	78	97.5
Purification of drinking water		
Yes	40	50
No	40	50
Toilet facilities		
Yes	78	97.5
No	2	2.5
Hand washing after toilet		
Yes	78	97.5
No	2	2.5
Household		
waste management		
Burial and Incineration	37	46.2
Throwing	43	53.8
Cooking fuel		
Firewood	59	73.8
LPG	21	26.2

4.6 Prevalence of malnutrition

Anthropometric indices are the major tool for the assessment of nutritional status of children. Deviation of anthropometric indices from the reference standard of those indices is the evidence of malnutrition. Generally, underweight, stunting and wasting are widely used indicators of malnutrition (Shrestha, 2014).

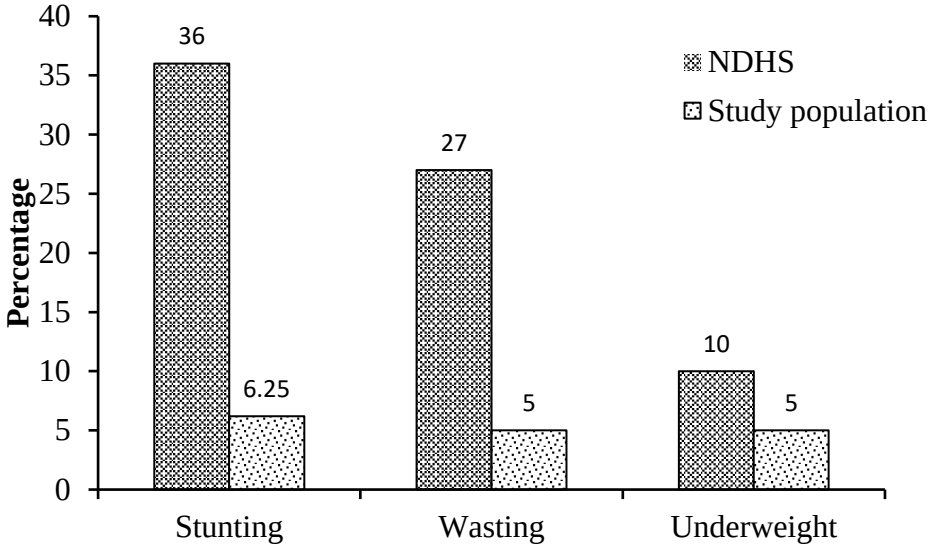

Fig 4.1: Prevalence of under nutrition in the study area in comparison to NDHS 2016

The overall magnitude of malnutrition among 6–59 months children in Rajbanshi community residing at Mechinagar Municipality of Jhapa District were 6.25%, 5% and 5% for Stunting, Underweight and Wasting respectively as shown in Figure 4.1. Moreover, severe and moderate Stunting was found to be 1.25% and 5% respectively. Severe and moderate underweight was found to be 1.25% and 3.75% respectively and on the other hand prevalence of severe and moderate Wasting was found 2.5% and 2.5% respectively as shown in Figure 4.2.

MoPH (2016) showed the prevalence of stunting, underweight and wasting to be 36%, 27% and 10% respectively. Comparing with national data, the prevalence of stunting, underweight and wasting in the study area were found to be lower than the national data. A similar study conducted in Prakashpur VDC of Sunsari district showed that there was high prevalence of stunting (53.7%), underweight (26.1%) and wasting (11.5%), which was greater than the result finding of this study (Khadka, 2017). This may be different because of the different ethnic group, study area, socioeconomic characteristic, and geographical characteristics of the study area. Prevalence of wasting was found to be higher than the cross-

sectional study conducted on Beta-Israel children in Amhara region, where 4.9% of children aged 6-59 months were wasted (Asres and Eidelman, 2011).

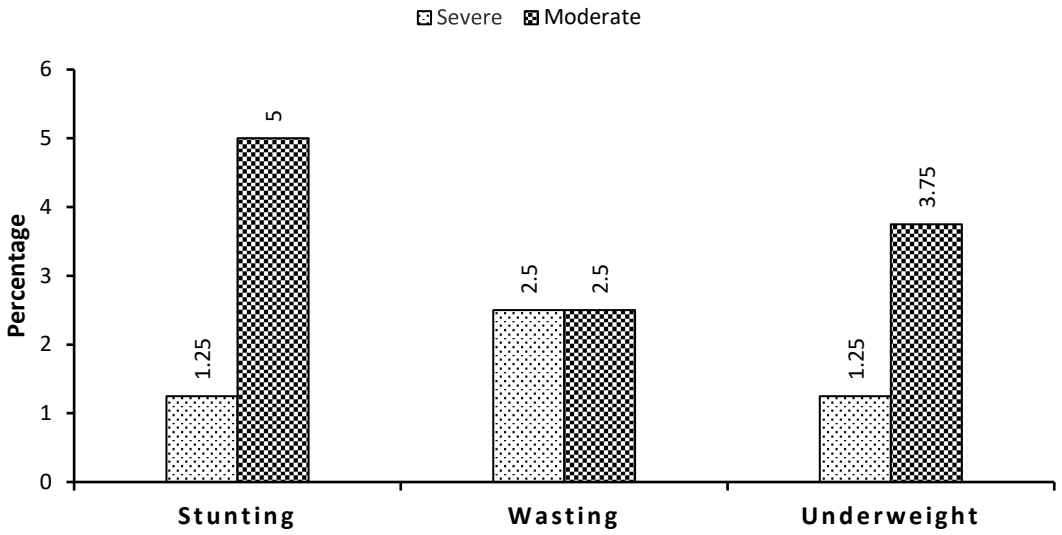

Fig 4.2: Prevalence of stunting, underweight and wasting among survey population.

4.6.1 Distribution of malnutrition based on gender

The prevalence of wasting was found higher in females (3.75%) than that in males (1.25%) which is opposite than that of the findings of (MoPH, 2016). Similarly, the rate of stunting was also found to be higher in females (3.75%) than that in males (2.5%). The prevalence of underweight was found to be similar in both males (2.5%) and females (2.5%) and this finding was lower to the findings of (MoPH, 2016).

Table 4.7 Gender wise distribution of wasting, stunting and underweight (n=80)

	Characteristics	Male (%)	Female (%)	All (%)
WHZ	Severely wasted (<-3)	Nil	2.5	2.5
	Moderately wasted (>-3 and <-2)	1.25	1.25	2.5
	Normal	41.3	53.7	95
HAZ	Severely stunted (<-3)	1.25	Nil	1.25
	Moderately stunted (>-3 and <-2)	1.25	3.75	5
	Normal	38.8	53.7	92.5
WAZ	Severely underweight (<-3)	Nil	1.25	1.25
	Moderately underweight (>-3 and <-2)	2.5	1.25	3.75
	Normal	40	55	95

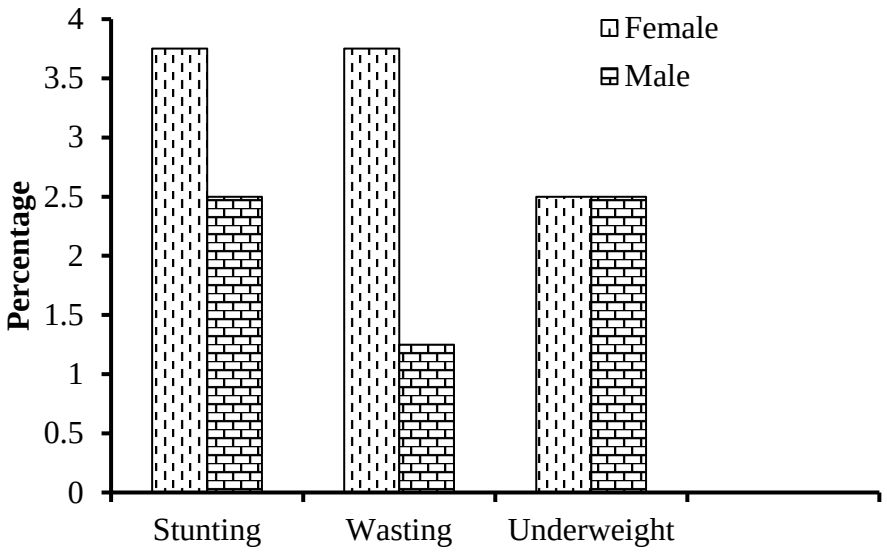

Fig 4.3: Gender wise distribution of stunting, wasting and underweight

4.6.2 Distribution of malnutrition based on MUAC

The prevalence of wasting based on MUAC measurement is shown in Table 4.9. On the basis of MUAC, 5% (4) of the children fall into moderate acute malnutrition criteria (MUAC: <115 mm). Out of 80 children, 1.25% (1) of the children falls into severe acute malnutrition criteria (MUAC: 115 mm - 125 mm). The remaining 96.25% (77) fall in the normal criteria (MUAC: >125mm). A similar study conducted at Panchgachhi VDC, Jhapa showed that 6.2% of the children were malnourished based on MUAC reading (Dhakal, 2015).

Table 4.8 Distribution of malnutrition based on MUAC (n=80)

Class	MUAC	Frequency	Percent
Severe Acute Malnutrition	<115 mm	1	1.25
Moderate Acute Malnutrition	115-125 mm	4	5
Normal	>125 mm	75	93.75

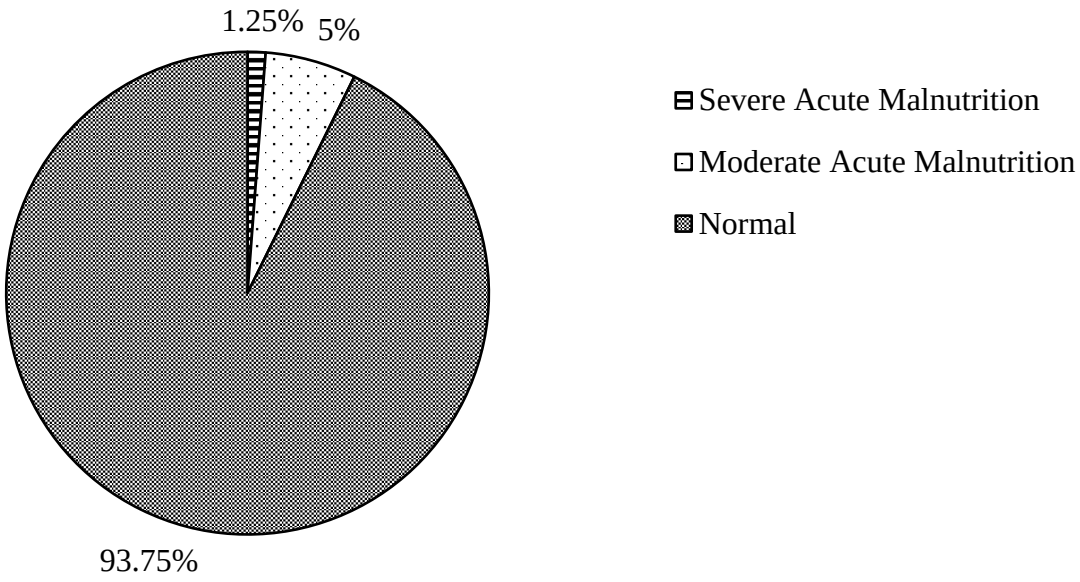

Fig 4.4: Distribution of malnutrition based on MUAC (n=80)

4.6.4 Nutrition status comparison with WHO standard

Distribution of stunting, underweight and wasting among under five children of Rajbanshi community residing in Mechinagar Municipality based on WHO standard are shown in the Figure 4.6, 4.7 and 4.8 respectively.

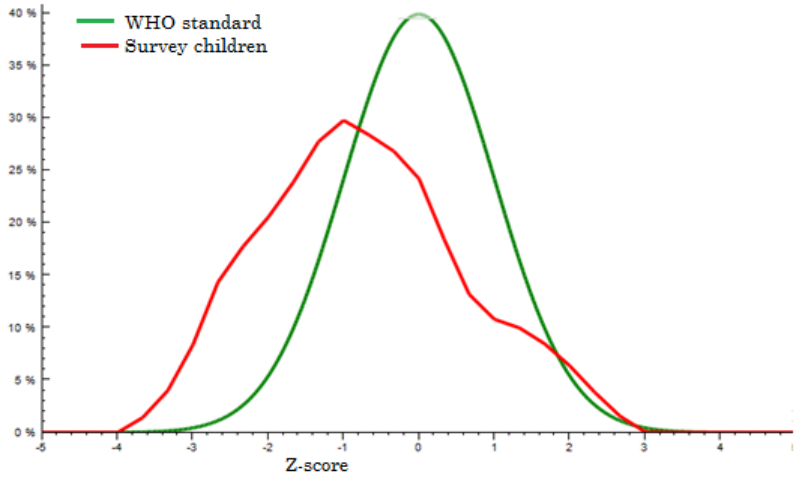

Fig 4.5: Distribution of stunting among 6 to 59 months children of Rajbanshi community residing in Mechinagar Municipality based on WHO standard (n=80)

Fig. 4.5 shows that the median Height for Age z-score of survey children to be -1.85 which is less than the reference to WHO standard. This curve is skewed to the left side of WHO standard curve showing high prevalence of stunting among study population.

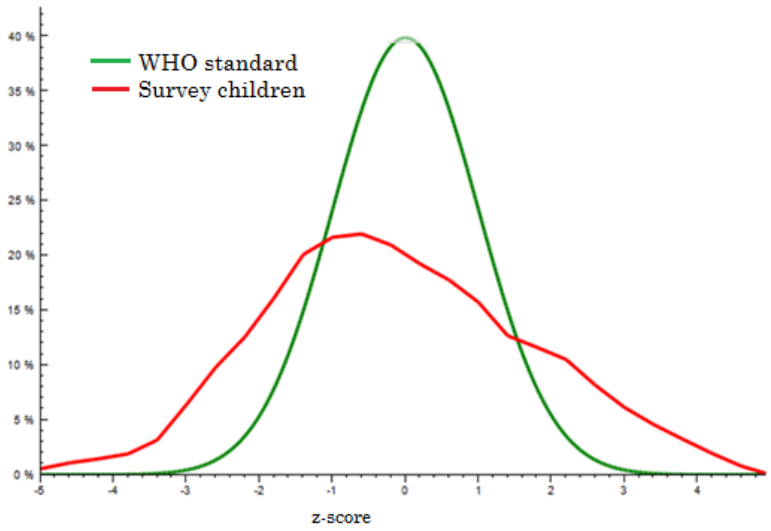

Fig 4.6: Distribution of underweight among 6 to 59 months children of Rajbanshi community residing in Mechinagar Municipality based on WHO standard (n=80)

Fig. 4.6 show that the median of Weight for Age z-score of the survey children was found to be -0.8, which is less than the reference to WHO standard. This curve is skewed to the left side of WHO standard curve showing prevalence of underweight among study population.

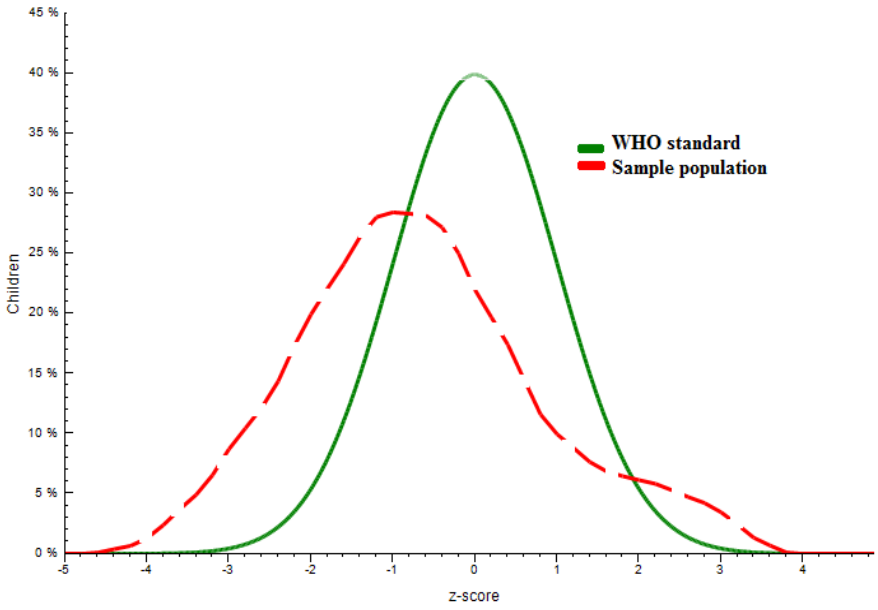

Fig 4.7: Distribution of wasting among 6 to 59 months children of Rajbanshi community residing in Mechinagar Municipality based on WHO standard (n=80)

Fig. 4.7 shows that the median Weight for Height z-score of survey children was found to be -1.0 which is less than the reference to WHO standard. This curve resembles the standard curve but is slightly skewed to left showing prevalence of underweight among study population.

4.7 Factors associated with under nutrition of Children

Under nutrition was assessed by stunting, wasting and underweight. Chi-square test and Fischer exact test were used to identify the characteristics that were related to nutritional status of children.

4.7.1 Factors associated with stunting

There was significant association of stunting with continuing breastfeeding for 2 years ($P \leq 0.05$). Survey also shows that there was no significance association of family type, birth order, annual family income, immunization during pregnancy, exclusive breastfeeding and initiation of breast feeding. The finding of the survey shows that the prevalence of stunting is found significant with discontinuing breastfeeding before children second birthday. It showed that the mother, who did not breast-feed continuously for 2 years are likely to be stunted. This evidence can be supported with the fact that in mother milk is the major source of protein and other vital nutrients which help children to grow and develop. The result was found consistent with the study conducted in Rupandehi district (Acharya *et.al.,* 2013). Major factors associated stunting is shown below.

Table 4.9 Factors associated with stunting among 6 to 59 months children of Rajbanshi community residing in Mechinagar Municipality (n=80)

Factors		**HAZ**		**Chi-square**	**P-value**
		Stunted	**Normal**		
Type of family	Nuclear	1 (1.25%)	43 (53.75%)	2.640	0.104
	Joint	4 (5%)	32 (40%)		
Birth order	First	4 (5%)	41 (%)	1.323	0.516
	Second	1 (1.25%)	28 (%)		
	Third	Nil	6 ()		
Annual income	< 1 lakhs	2(2.5%)	22 (27.5%)	0.356	0.837
	≥ 1 lakhs	3 (3.75%)	53 (66.25%)		
Immunization	Yes	5 (6.25%)	65 (%)	0.762	0.383
during pregnancy	No	Nil	10 (%)		
Breast feeding for	Yes	2(2.5%)	64 (%)	6.672	0.01*
2 years	No	3(3.75%)	11(%)		
Exclusive	Yes	4 (5%)	61 (%)	0.005	0.457
Breastfeeding	No	1 (1.25%)	14 (%)		
Initiation of	Within 1 hour	3(3.75%)	48 (%)	1.265	0.531
Breastfeeding	After 1 hour	2 (2.5%)	27 (%)		

***** Statistically significant (P<0.05)

4.7.2 Factors associated with underweight

Cross- tab with chi-square value and p value of underweight with different study variable are shown in Table 4.10. Family type (p=0.023), continuing breastfed for 2 year (p=0.002) and initiation of breastfeeding (p=0.003) were found to be significantly associated with underweight. Other determinants of nutritional status like annual family income, birth order, immunization during pregnancy and exclusive breastfeeding were not significant with underweight.

Table 4.10 Factors associated with underweight among 6 to 59 months children of Rajbanshi-community residing in Mechinagar Municipality (n=80)

Factors		**WAZ**		**Chi-square**	**P-value**
		Underweight	**Normal**		
Type of family	Nuclear	Nil	44 (55%)	5.146	0.023*
	Joint	4 (5%)	32 (40%)		
Birth order	First	4 (5%)	41 (%)	3.275	0.194
	Second	Nil	29 (%)		
	Third	Nil	6 ()		
Annual income	< 1 lakhs	2(2.5%)	22 (%)	1.303	0.521
	≥ 1 lakhs	2(2.5%)	54 (%)		
Immunization during pregnancy	Yes	1 (%)	16(%)	0.035	0.851
	No	3 (%)	60 (75%)		
Breast feeding for 2 years	Yes	1(1.25%)	65 (%)	9.642	0.002*
	No	3(3.75%)	11(%)		
Exclusive Breastfeeding	Yes	3(3.75%)	62 (%)	0.108	0.742
	No	1 (1.25%)	14 (%)		
Initiation of Breastfeeding	Within 1 hour	2(2.5%)	49 (%)	11.476	0.003*
	After 1 hour	2 (2.5%)	23 (%)		

***** Statistically significant (P<0.05)

The finding of the survey shows that the prevalence of underweight is found significant with family size. It showed that the family with ≥ 5 member had more chance of being underweight than the family with < 5 members. This evidence can be supported with the fact that in large family food has to be distributed to all the member of the family and child cannot get enough food to eat. The result was found consistent with the study conducted in Rupandehi district (Acharya et.al., 2013).

4.7.3 Factors associated with wasting

Statistical analysis of factors associated with wasting using chi- square test revealed that immunization during pregnancy and exclusive breast feeding were statistically significant with wasting. However, family type, birth order, annual family income, breastfeeding for 2 years and initiation of breastfeeding were not significant with wasting as shown in Table 4.11.

Table 4.11 Factors associated with wasting among 6 to 59 months children of Rajbanshi community residing in Mechinagar Municipality (n=80)

Factors		**WHZ**		**Chi-square**	**P-value**
		Wasting	**Normal**		
Type of family	Nuclear	2(2.5%)	42 (52.5%)	0.043	0.837
	Joint	2 (2.5%)	34 (42.5%)		
Birth order	First	2 (2.5%)	43 (53.75%)	1.896	0.388
	Second	1 (1.25%)	28 (35%)		
	Third	1 (1.25%)	5 (6.25%)		
Annual income	< 1 lakhs	2(2.5%)	22 (27.5%)	1.303	0.521
	≥ 1 lakhs	2 (2.5%)	54 (67.5%)		
Immunization	Yes	1 (1.25%)	16 (20%)	5.331	0.02*
during pregnancy	No	3 (3.75%)	60 (75%)		
Breast feeding for 2	Yes	3(3.75%)	63 (78.75%)	0.164	0.685
years	No	1(1.25%)	13(16.25%)		
Exclusive	Yes	1(1.25%)	64 (80%)	8.745	0.003*
Breastfeeding	No	3(3.75%)	12 (15%)		
Initiation of	Within 1 hour	2(2.5%)	49 (61.25%)	1.102	0.576
Breastfeeding	After 1 hour	2 (2.5%)	27 (33.75%)		

***** Statistically significant (P<0.05)

Duration of exclusive breastfeeding classified as below 6 months and 6 months or above was found to be significantly associated with wasting (p= 0.003). Children who were exclusively breastfed for less than 6 months were found to be more wasted compared to those who were exclusively breastfed 6 months or above. Similar result is found in study conducted in Empoured States Group (Kumor and Singh, 2015) and also in a study conducted at Morogoro municipality, Tanzaia in 2013 (Safari et al., 2013). Duration of exclusive

breastfeeding have a significant relation with wasting was said in a study conducted in South-west region of Bangladesh in 2013(M. Islam et al., 2013) and the study also showed similar result to the study. According to a study conducted in public Hospitals, Oromia region, West Ethopia, exclusively breast-fed child were less prone to acute malnutrition which is similar to the study (Ayana et al., 2015).

Type of vaccine and supplements give to pregnant women was also found to be associated with wasting making it a significant variable (p=0.02) where children of mother who were not given no any supplements and vaccines were found to be more wasted compared to other, as found in the study.

Part V

Conclusions and recommendations

5.1 Conclusions

As the general objective was to assess the nutritional status of 6 to 59 month's children of Rajbanshi community residing in Mechinagar Municipality of Jhapa district. In conclusion, the results of this study indicate that under nutrition is still an important problem among 6-59 month's age group children of Rajbanshi community. Few points can be concluded from the study:

i. There is a prevalence of under-nutrition among the 6-59 months children of Rajbanshi community residing in Mechinagar Municipality, Jhapa. i.e., stunting (6.25 %), underweight (5%) and wasted (5 %).

ii. Collectively, females were found to be more under nourished (stunted and wasted) than males i.e., prevalence of stunting (2.5% in males and 3.75% females) and wasting (1.25% in males and 3.75 % in females) respectively. Whereas, both male and female children contributed similar proportion regarding underweight prevalence i.e. 2.5%

iii. There was significant association of stunting with continuing breastfeeding for 2 years ($P \leq 0.05$), while family type ($p=0.023$), continuing breastfed for 2 year ($p=0.002$) and initiation of breastfeeding ($p=0.003$) were significantly associated with underweight. Moreover, immunization during pregnancy and exclusive breast feeding were statistically significant with wasting.

5.2 Recommendations

1. Prevalence of stunting was found slightly high than underweight and wasting. So, programs to improve the mother's nutritional status and intervention program on under 5-year children is required.
2. Another anthropometric nutritional survey during another season in the same areas should be conducted to determine seasonal variations and their effect on the nutritional status of the children.
3. Consider the provision of supplementary food and micronutrients targeting the most vulnerable in the community, pregnant and lactating women and children under.
4. Health education program should be conducted targeting behavior change for pregnant women, lactating mothers and caretakers of children, with a special focus on hygiene and sanitation and appropriate IYCF practices.
5. Moreover, to validate the data obtained from anthropometry and household survey biochemical tests and clinical examinations can be performed.
6. There is the need for intervening nutritional and health education to their parent as educated parents are most likely to provide better care in terms of healthy eating behavior and thus good nutrition and better hygiene practices which in turn improve the nutritional status of their children.

Part VI

Summary

Nutritional condition of children does not only serve as a health indicator, but it is also vital for the children susceptibility of many other diseases. The study was conducted to assess the nutritional status of 6-59 months children of Rajbanshi community residing in Mechinagar Municipality, Jhapa.

The study included 80 children taken under study in basis of stratified simple random sampling method. Cross-sectional descriptive survey using measurements of weight, height and MUAC was carried out to determine the nutritional status and structured questionnaire was administered to the parent to study socio-demographic condition and its association with malnutrition. The prevalence of malnutrition among survey children based on gender age and WHO reference was also studied. Data collected was analyzed using WHO Anthro-plus and SPSS version 20.2. Chi-square test was used to analyze the association of malnutrition among children.

Out of 80 children, 34 were boys and 46 were girls. This survey shows that 63.8 % of mother breastfed their child within 1 hour of the delivery, 28.8% of them breastfed their child within 8 hours whereas 7.5% of mother breastfed their child after 24 hours of delivery. Majority of child initiated complementary feeding at the age of 6 months with 71.2%, following at the age of 5 months with 18.8%, 4 months with 10% respectively. According to length/height for age, 6.25% of children were stunted. Among them, 1.25% was severely stunted. Stunting was found higher in boys than girls. According to weight for height, 5% of children were underweight among them 2.5% were severely wasted and 2.5% were moderately wasted. The prevalence of underweight was found higher in female. According to weight for age, 5% children were under-weight and among them 3.75% were moderately thinned and 1.25% was severely thinned. Wasting was found in equal proportion in both boys and girls. There was significant association of stunting with continuing breastfeeding for 2 years ($P \leq 0.05$), while no significance association was reported with regards to family type, birth order, annual family income, immunization during pregnancy, exclusive breastfeeding and initiation of breast feeding. Results of the present study indicate that malnutrition is also existing problem among 6-59 months children of Rajbanshi community. Further intervention program can be conducted to reduce prevalence of malnutrition among them.

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Appendices

Appendix A1

Consent letter

Namaste!

I, Mr. Denish Sitoula, graduate student in Department of Nutrition and Dietetics conducting a dissertation work for award of bachelor's degree in Nutrition and Dietetics.

The topic for the study is **"*Nutritional status of 6 - 59 months children among Rajbanshi community in Mechinagar Municipality, Jhapa*"**.

I have been told in a language that I understand about the study. I have been told that this is for a dissertation procedure, that my and my son/daughter's participation is voluntary and he/she reserve the full right to withdraw from the study at my own initiative at any time without having to give reason and that refresh to participate or withdraw from the study at any stage will not prejudice my/his/her rights and welfare. Confidentiality will be maintained and only be shared for academic purposes.

I hereby give consent to participate in the above study. I am also aware that I can withdraw this consent at any later date, if I wish to. This consent form being signed voluntarily indicates participate in the study until I decide otherwise. I understand that I will receive a signed and dated copy of this form.

I have signed this consent forms before my participation in the study.

Signature of parent/guardian: _____ Sign of witness: _____

Date: Date:

Place: Place:

I hereby state the study procedures were explained in the detail and all questions were fully and clearly answered to the above-mentioned participant /his/her relative.

Investigator's sign:

Appendix A2

Survey Questionnaire

Code no.:- Date of Interview: 2077/ 7 / 13

A. General Information

1. Name of head of household:
2. Ward No.:
3. Respondent: Mother Father Other Family Members
4. Mother's Name:
5. Mother's Age:
6. Child Name: DOB:

B. Family Description

7. No. of total family members:

   Female: Male:

   No. of children: Boys: Girls: No. of children below 5 years:

8. Type of family? I) Nuclear II) Joint
9. House, currently you living is… i) Own ii) Rent
10. What is the main occupation of your family?

    a) Agriculture b) Service c) Labour d)Business e) Foreign employment f)Others

11. Annual income of your family: a. < 1 lakh b. 1 to 3 lakh c. > 3 lakh
12. Mothers' educational qualification

    a. Illiterate b. Primary level c. Secondary level d. Higher

13. Fathers' educational qualification

    a. Illiterate b. Primary level c. Secondary level d. Higher secondary and above

C. Personal and environmental hygiene

14. What is your source of drinking water?

a. Tube well b. River c. Well d. Drinking water tap e. Other

15. Do you purify drinking water? a. No b. Yes

16. Do you have toilet facility in your house? a. No b. Yes

17. What cooking fuel do you use for cooking?

a. Fire wood b. Dung gas c. Dried animal dung d. Stove e. LPG f. Others

18. How do you manage garbage coming out from your house?

……

D. Questions to be asked for mother of under 5 children

19. No. of under 5-year children:

20. Birth order of child under study: ……

21. Birth spacing: …… months/years

22. Do your child have any type of medical complications? a. Yes b. No

23. Where do you take your children for treatment during illness?

a. Nearby health post b. Pharmacy c. FCHV d. Traditional healer

e. Donot take anywhere f. Others

E. Nutrition and Breastfeeding related information

24. Did you breast fed your child on the day of birth? a. No b. Yes

25. Did you breast fed your child? a. No b. Yes

26. If not, what is the reason?

a. Lack of tradition b. It harms c. It is unhygienic d. Child cannot swallow

e. Others

27. If Yes, then when did you initiate breast feeding?

a. within 1 hour of birth b. Within 8 hours of birth c. Within 24-hour of birth

d. Cannot remember e. Other

28. Did you feed colostrum to your baby?

a. Yes b. No c. Cannot remember

29. What did you feed to your baby before feeding colostrum milk?

a. Nothing b. Honey and Ghee c. Cow's milk d. Alcohol e. Others

30. Are you breast feeding your child? a. Yes b. No

31. How long a child should be breast fed or how long did you breast feed your child?

…… months/years

32. Did you exclusively breast fed your baby for six months? a. Yes b. No

33. Did you feed commercial or formula milk to your baby? a. Yes b. No

34. When did you start giving foods other than breast milk to your child?

a. 4 months b. 5 months c. 6 months d. 7 months e. More than 7 months

35. How many times do you feed food other than breast milk to your child? …….times/day

36. What do you feed to your child?

a. Lito b. Jaulo c. Supper flour porridge d. Same as other family members e. Others

37. What is the proportion of cereals and pulses in supper flour porridge?

a.1:1 b. 1:2 c. 2:1 d. No fixed ratio

38. Do you know about malnutrition? a. Yes b. No

39. If yes, what is the main cause of malnutrition?

a. Inadequate balanced diet b. Being touched by pregnant women

c. Curse of God d. Others

40. Do you use iodized salt? a. No b. Yes

F. Child and Maternal Health Related Information

41. Mother's age when she got married? …….. years

42. Mother's age when she was pregnant for first time? ……. years

43. Type of birth? a. Natural b. Caesarian

44. Weight of child during birth? a. less than 2.5 Kg b. More than 2.5 Kg c. Don't know

45. Do pregnant mother require additional nutrients? a. No b. Yes

46. How do you manage food for pregnant women in your family?

a. Give more food than usual b. Give less food than usual

c. Give same amount of food as before

47. Did you take iron and folate tablet during pregnancy? a. No b. Yes

48. If yes, how long did you take it? ……

G. Anthropometric measurements

	Weight (kg)	**Height (cm)**	**MUAC (mm)**
Reading 1			
Reading 2			
Reading 3			

…… ……

Signature of Respondent Signature of Interviewer

Appendix A3

Photo gallery

Plate 1: Measuring height

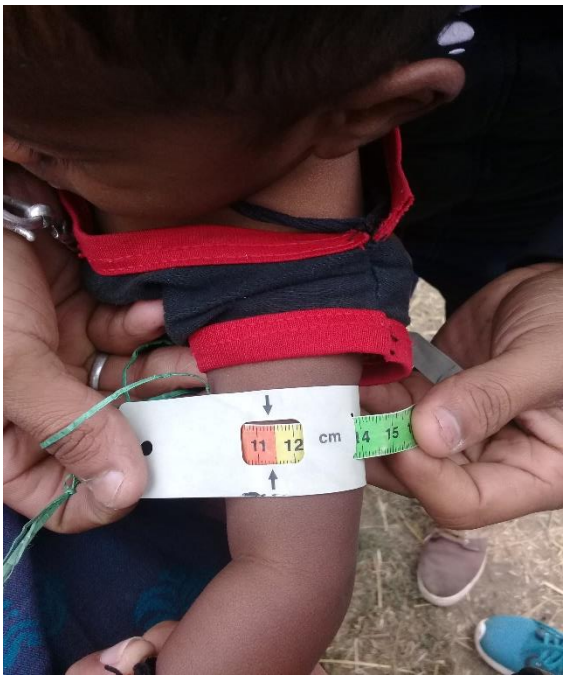

Plate 2: Measuring MUAC